## REMARKS

By this amendment, Applicant has amended independent claims 1 and 14, and has canceled claims 7 and 20 (claims 8-13 were canceled in a previous amendment and response). Thus, claims 1-6 and 14-19 remain in the present application. Reconsideration and allowance of pending claims 1-6 and 14-19 in light of the above amendments and the following remarks are respectfully requested.

### A. Rejections of Claims 1-3, 6-7, 14-16, and 19-20 Under 35 USC § 102(e) and Claims 4-5 and 17-8 Under 35 USC § 103(a)

The Examiner has rejected claims 1-3, 6-7, 14-16, and 19-20 Under 35 USC § 102(e) as being anticipated by U.S. Patent 6,740,605 to Shiraiwa et al. (hereinafter "Shiraiwa"). Further, the Examiner has rejected claims 4-5 and 17-8 Under 35 USC § 103(a) as being unpatentable over Shiraiwa. For the following reasons, Applicant respectfully submits that the amended claims are patentably distinguishable over Shiraiwa.

Shiraiwa is directed to a process for fabricating a semiconductor device that is less susceptible to performance degradation caused by hydrogen contamination. Shiraiwa discloses steps for removing unwanted hydrogen bonds by exposing the hydrogen bonds to ultraviolet radiation sufficient to break the bonds and annealing in an atmosphere using a gas, such as oxygen ($O_2$), ozone ($O_3$), or a source of nitrogen such as NO, $N_2O$, or $N_2$, capable of forming bonds that replace the hydrogen bonds. See Figure 12 of Shiraiwa

and related description on column 11. However, as the Examiner has acknowledged on page 2 of the Office Action, Shiraiwa does not disclose a motivation to reduce charge loss by reducing hydrogen content, but simply a desire to reduce hydrogen content to reduce contamination and a "hypothesis" that hydrogen migration into bottom or top oxide dielectric layers can cause undesirable effects by changing the "barrier height" in those layers. Shiraiwa is completely silent as to how hydrogen content in the nitride layer itself results in threshold voltage shifting and a desire to reduce hydrogen content in the nitride to reduce charge loss in the nitride layer itself is not taught by Shiraiwa. See, for example, column 2, lines 29-49 of Shiraiwa.

In contrast, referring to Figure 1 of the present application, due to the reduced hydrogen content in nitride layer 120, the amount of hydrogen radicals than can be freed in nitride layer 120 during subsequent programming operations is greatly reduced. Consequently, the charge loss in nitride layer 120 is significantly reduced. As a benefit, the reduction of charge loss in nitride layer 120 significantly reduces the threshold voltage shift in resulting memory cell structure 100. See, for example, the present application page 9, lines 1-6. Moreover, the present invention requires use of highly reactive nitrogen radicals in a unique CVD process to minimize number of hydrogen radicals. As stated in the present application at step 320 in flowchart 300, a unique CVD process is used to form a nitride layer having reduced charge loss over the first oxide layer. In an exemplary embodiment, a precursor comprising silane and a highly reactive form of nitrogen is used in a CVD process at a temperature of about 400 to 650° C. For example, microwave energy, or other similar processing, may be use to break up nitrogen ($N_2$) into a highly

reactive form of nitrogen, i.e. to form "nitrogen radicals". With the unique CVD process described above, a nitride layer having significantly reduced hydrogen content is achieved. As discussed above, the reduced hydrogen content in the nitride layer results in a nitride layer having reduced charge loss. With reference to Figure 2, nitride layer 220 is formed over first oxide layer 215 during step 320. See, for example, the present application page 11, lines 13-22 and Figures 2 and 3.

The amended independent claims further distinguish the invention over Shiraiwa in that they require a charge storing layer formed from nitrogen radicals having silicon nitride with reduced hydrogen content, where the reduced hydrogen content reduces charge loss in the charge storing layer. As such, Applicant respectfully submits that amended independent claims 1 and 14 are patentably distinguishable over Shiraiwa, and thus claims 2-6 and 15-19 depending respectively from amended independent claims 1 and 14 are also patentable for reasons similar to those discussed above and also for added limitations therein.

## B. Conclusion

For the foregoing reasons, Applicant respectfully submits that claims 1 and 14 and dependent claims 2-6 and 15-19 are patentable over the art of record and as such an early notice of allowance directed to claims 1-6 and 14-19 remaining in the present application is respectfully requested.

Attorney Docket No.: 0180139

Respectfully Submitted,
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Dated: 3/3/05

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